DOE/NV/25946--505

FACILITY CLOSURE REPORT FOR T-TUNNEL (U12T), AREA 12, NEVADA TEST SITE, NEVADA

Revision: 0

August 2008

Prepared by National Security Technologies, LLC
for the U.S. Defense Threat Reduction Agency

FACILITY CLOSURE REPORT FOR T-TUNNEL (U12T), AREA 12, NEVADA TEST SITE, NEVADA

Prepared by:
National Security Technologies, LLC
Las Vegas, Nevada

August 2008

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FACILITY CLOSURE REPORT FOR
T-TUNNEL (U12T), AREA 12,
NEVADA TEST SITE, NEVADA

Approved By: _____ Date: _____

Reed J. Poderis, Project Manager
National Security Technologies, LLC
Defense Threat Reduction Agency

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ACRONYMS AND ABBREVIATIONS

DTRA	Defense Threat Reduction Agency
FCP	Facility Closure Plan
FCR	Facility Closure Report
GSD	Gas Seal Door
GSP	Gas Seal Plug
M&OC	Management and Operations Contractor
NDEP	Nevada Division of Environmental Protection
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NTS	Nevada Test Site
NWET	Nuclear Weapons Effects Test
UGTA	Underground Test Area

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EXECUTIVE SUMMARY

The U12t-Tunnel (T-Tunnel) is located in Area 12 of the Nevada Test Site. T-Tunnel is not listed in the *Federal Facility Agreement and Consent Order*. The closure of T-Tunnel was sponsored by the Defense Threat Reduction Agency (DTRA) and performed with the cooperation of the U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office and the Nevada Division of Environmental Protection (NDEP).

The strategy for closure of this site is described in the NDEP-approved *Facility Closure Plan for N- and T- Tunnels Area 12, Nevada Test Site* (Appendix D). Closure activities included:

- Removing and disposing of an oil-filled circuit breaker, fire extinguishers, and fluorescent light fixtures.
- Removing and entombing radiologically impacted vent lines within the T-Tunnel radiologically controlled area.
- Sealing the identified asbestos backboards in place as a hazard-reducing best management practice. The Facility Closure Plan (FCP) indicates that asbestos pipe insulation will be removed and disposed; however, there was no asbestos pipe insulation to remove.
- Sampling groundwater at the Gas Seal Door (GSD) from both the main and alternate water line, by Underground Test Area personnel.
- Plugging the water sample collection lines and the drain line that penetrated the GSD.
- Constructing a concrete sarcophagus on the portal side of the GSD to entomb all exposed sample collection lines and the drain line and to protect the lines from potential rock fall.
- Constructing a full-tunnel cross-section grout bulkhead to prevent access to the tunnel.
- Grouting the vent raise from the top of the bulkhead to the ground surface.

T-Tunnel was closed in accordance with the NDEP-approved FCP (Appendix D).

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1.0 INTRODUCTION

This Facility Closure Report (FCR) has been prepared to document the actions taken to permanently close the remaining accessible areas of U12t-Tunnel (T-Tunnel) in Area 12 of the Nevada Test Site (NTS). The closure of T-Tunnel was a prerequisite to transfer facility ownership from the Defense Threat Reduction Agency (DTRA) to the U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office (NNSA/NSO). Closure of the facility was accomplished with the cooperation and concurrence of both NNSA/NSO and the Nevada Division of Environmental Protection (NDEP).

1.1 PURPOSE

The purpose of this FCR is to document that the closure of T-Tunnel complied with the closure requirements specified in the *Facility Closure Plan for N- and T- Tunnels Area 12, Nevada Test Site* (Appendix D) and that the facility is ready for transfer to NNSA/NSO. The Facility Closure Plan (FCP) is provided in Appendix D.

T-Tunnel is located approximately 42 miles north of Mercury in Area 12 of the NTS (Figure 1). Between 1970 and 1987, T-Tunnel was used for six Nuclear Weapons Effects Tests (NWETs). The tunnel was excavated horizontally into the volcanic tuffs of Rainier Mesa. The T-Tunnel complex consists of a main access drift with two NWET containment structures, a Gas Seal Plug (GSP), and a Gas Seal Door (GSD) (Figure 2). The T-Tunnel complex was mothballed in 1993 to preserve the tunnel for resumption of testing, should it happen in the future, to stop the discharge of tunnel effluent, and to prevent unauthorized access. This was accomplished by sealing the main drift GSD.

1.2 SCOPE

The approved facility closure strategy for T-Tunnel was specified in the FCP (Appendix D). The FCP describes the containment structure (bulkhead) and procedure for closure of the accessible areas of the tunnel. Prior to closure, extensive water sampling was conducted by the Underground Test Area (UGTA) group. The UGTA water sampling activities were outside the scope of this FCP.

The implemented facility closure strategy consisted of the following activities:

- Removing and disposing of an oil-filled circuit breaker (reported in the FCP as a transformer), all fire extinguishers, and fluorescent light fixtures.
- Removing and entombing radiologically impacted vent lines within the T-Tunnel radiologically controlled area.
- Sealing the identified asbestos backboards in place as a hazard-reducing best management practice. The FCP indicates that asbestos pipe insulation will be removed and disposed; however, there was no asbestos pipe insulation to remove.
- Plugging the water sample collection lines and the drain line that penetrate the GSD.

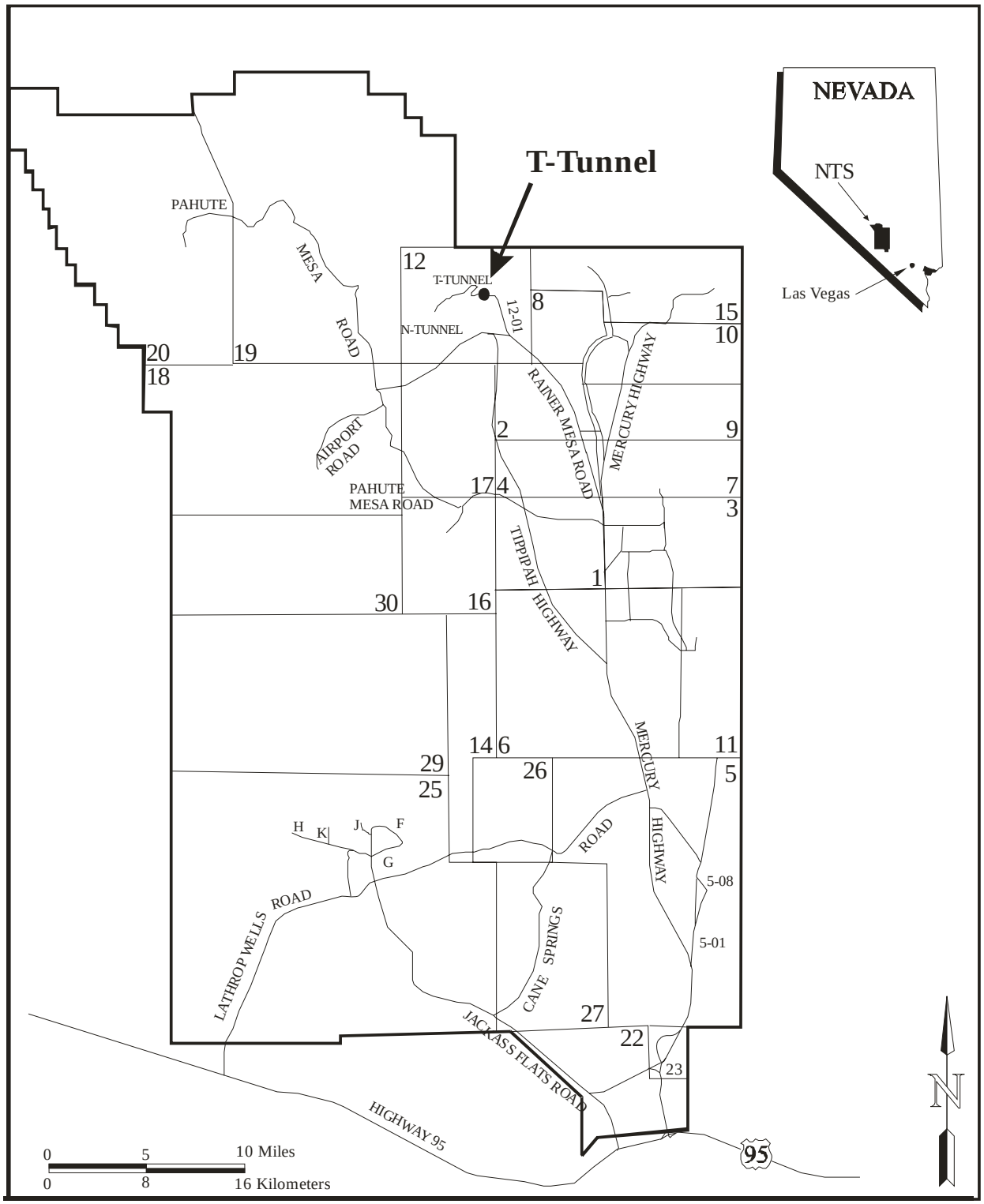
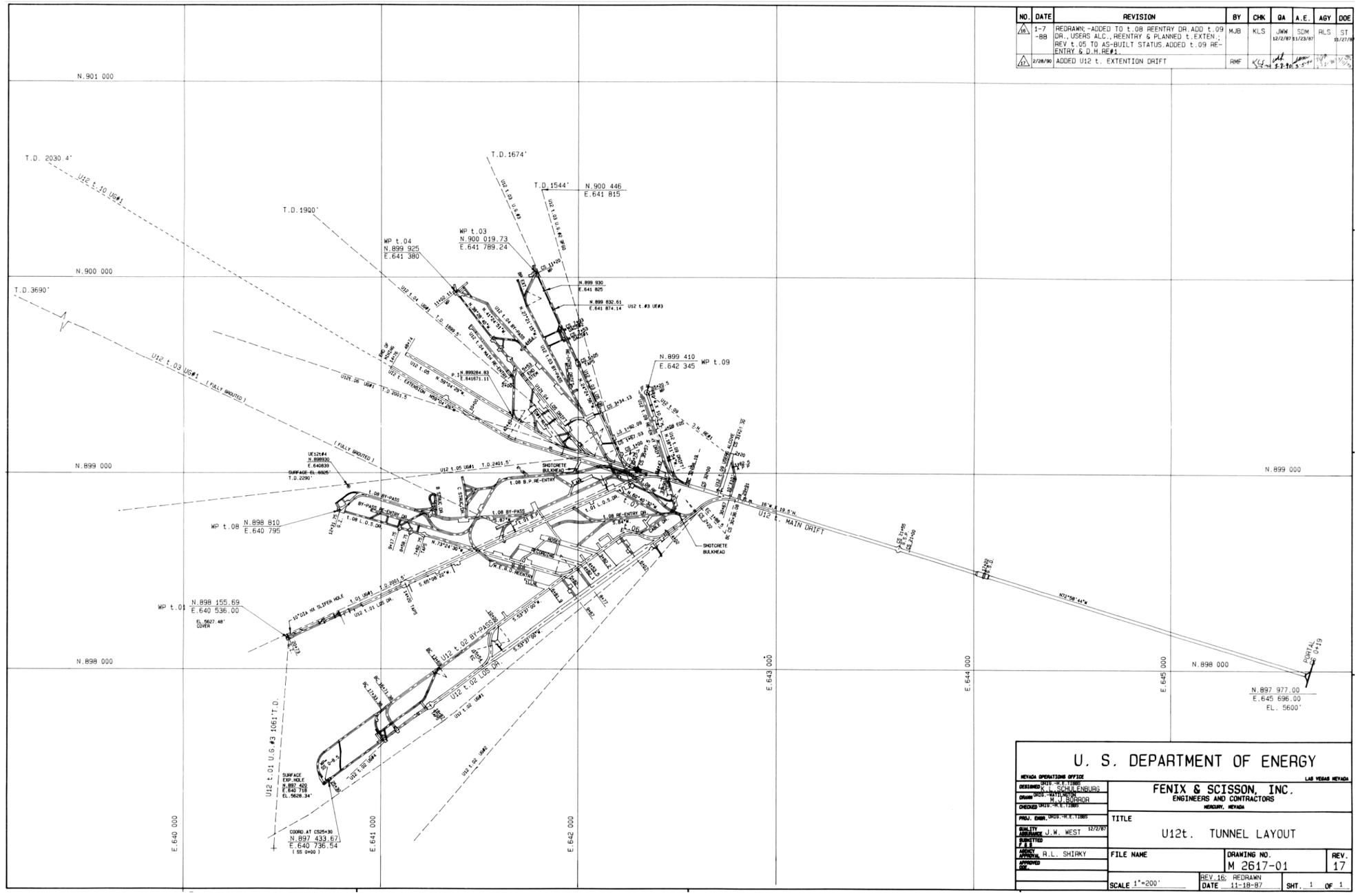


FIGURE 1. LOCATION OF T-TUNNEL



NO.	DATE	REVISION	BY	CHK	QA	A.E.	AGY	DOE
16	1-7-88	REDRAWN; -ADDED TO t.08 REENTRY DR. ADD t.09 DR., USERS ALC., REENTRY & PLANNED t. EXTEN.; REV t.05 TO AS-BUILT STATUS. ADDED t.09 RE-ENTRY & D.H. RE#1.	MJB	KLS	JWW 12/2/87	SDM 11/23/87	RLS	SI 12/27/87
17	2/28/90	ADDED U12 t. EXTENTION DRIFT	RMF	KLS				

U. S. DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE — LAS VEGAS NEVADA

DESIGNED	K.L. SCHULENBURG
DRAWN	M.J. BORROR
CHECKED	
PROJ. ENGR.	
QUALITY ASSURANCE	J.W. WEST 12/2/87
SUBMITTED	
AGENCY APPROVAL	R.L. SHIRKY
APPROVED DOE	

FENIX & SCISSON, INC.
ENGINEERS AND CONTRACTORS
MERCURY, NEVADA

TITLE: U12t. TUNNEL LAYOUT

FILE NAME	DRAWING NO.	REV.
	M 2617-01	17

SCALE 1"=200' | REV.16; REDRAWN DATE 11-18-87 | SHT. 1 OF 1

FIGURE 2. T-TUNNEL SITE LAYOUT MAP

- Constructing a concrete sarcophagus on the portal side of the GSD to entomb all exposed sample collection lines and the drain line and to protect the lines from potential rock fall.
- Constructing a full-tunnel cross-section grout bulkhead to prevent access to the tunnel.
- Grouting the vent raise from the top of the bulkhead to the ground surface.

1.3 FACILITY CLOSURE REPORT CONTENTS

This FCR is divided into the following sections:

- Section 1.0 Introduction
- Section 2.0 Facility Closure Activities
- Section 3.0 Waste Disposition
- Section 4.0 Facility Closure Verification Results
- Section 5.0 Summary
- Section 6.0 References
- Appendix A As-Built Drawings
- Appendix B Closure Photographs
- Appendix C T-Tunnel Facility Closure Pressure Test Forms
- Appendix D Facility Closure Plan for N- and T- Tunnels, Area 12, Nevada Test Site
- Appendix E Final Facility Closure Verification Site Visit Attendance Roster

This FCR was developed based upon the recommendations set forth in the following document:

- *Facility Closure Plan for N- and T- Tunnels, Area 12, Nevada Test Site* (Appendix D)

Construction quality was controlled by ensuring adherence to the design engineering specifications developed for the FCP (Appendix D). Verification of the design is documented in the construction "as-built" drawings included in Appendix A of this document.

2.0 FACILITY CLOSURE ACTIVITIES

This section of the FCR details the specific activities involved in the closure of the T-Tunnel facility. As-built engineering drawings are provided in Appendix A. Photographs of the closure activities and completed work are provided in Appendix B.

2.1 DESCRIPTION OF FACILITY CLOSURE ACTIVITIES

Closure of the T-Tunnel facility was completed using the approved FCP (Appendix D). Prior to beginning closure activities, the following pre-field activities were completed:

- Preparation of *National Environmental Policy Act* documentation
- Preparation of the T-Tunnel Facility Closure Field Work Package
- Preparation of the T-Tunnel Facility Closure Task Site-Specific Health and Safety Plan

Facility closure activities were conducted from June 7, 2006, to May 24, 2007, and consisted of stabilizing the tunnel by re-lagging the tunnel roof and walls, removing and disposing of waste, grouting the sampling and drain lines that penetrate the GSD, constructing a grout sarcophagus at the GSD, relocating radiologically contaminated parts to within the tunnel's radiological material area, and constructing a fibercrete bulkhead near the portal entrance. The following sections detail the scope of actions implemented for the T-Tunnel facility closure. Daily reports of the closure progress are maintained in the Management and Operations Contractor (M&OC) project files located at the NTS.

2.1.1 Re-Lag Tunnel Walls and Roof

Old lagging on the roof and walls of T-Tunnel had failed in numerous places and had allowed sloughing of the surrounding rock into portions of the tunnel. Lagging was replaced where needed to protect workers during closure activities.

2.1.2 Waste Removal and Disposal

Miscellaneous debris, construction-type waste materials, fluorescent light fixtures, and other items that are no longer useable were removed from the tunnel and disposed of appropriately. All waste was screened to verify that radiological contamination was less than the free-release limit established in the NV/YMP Radiological Control Manual (NNSA/NSO, 2004). Sanitary waste was transported to and disposed of in the Area 23 Sanitary Landfill at the NTS. A non-polychlorinated biphenyl oil-filled circuit breaker was removed by the electricians and placed into their inventory, where it will either be re-used or disposed of along with other electrical equipment in accordance with their waste management plans.

Vent lines from the T-Tunnel roof up through the vent raise were radiologically contaminated. Because T-Tunnel is a radiologically controlled area, the vent lines were removed and placed within the tunnel, to be entombed within T-Tunnel behind the fibercrete bulkhead that was later constructed. The ends of the piping were covered as they were exposed, to prevent the spread of any radioactivity during removal and relocation activities.

2.1.3 Sample and Drain Line Plugging and Sarcophagus

Water sample lines and a drain line were installed when the tunnel was mothballed in 1993. These 1- and 2-inch-diameter pipes facilitated the sampling of water impounded behind the GSP and the GSD. One set of sample lines, a main and an alternate, penetrated the GSD and the GSP to permit sampling of water from behind the GSP. A second set of sample lines, also a main and an alternate line, penetrated only the GSD to permit sampling of water from behind the GSD. A drain line was present between the two sets of sample lines. The UGTA group was separately tasked by NNSA/NSO to collect final water samples prior to the plugging and entombment of the sample lines.

After samples had been collected, the sample lines were then plugged by pressure grouting and capping the lines. All lines were then entombed in a grout sarcophagus to prevent damage from potential rock fall. The sequence of events to plug sample lines and construct the sarcophagus is depicted in photographs provided in Appendix B.

2.1.4 Bulkhead Construction

A grout bulkhead was constructed near the main drift portal, underneath the vent raise, to prevent access to the tunnel (see Figure 3 or Appendix A for exact location). The bulkhead form was constructed by tack welding 1/4-inch, 18-gauge expanded metal sheets to 3-5/8-inch, 16-gauge steel studs on 16-inch horizontal and 24-inch vertical centers. The expanded metal frame was then sprayed with fibercrete to a thickness of 6 inches. Grout was poured into the vent raise to create the bulkhead. Access to the tunnel is thereby blocked by the newly constructed bulkhead. Access to the bulkhead is controlled by a locked portal gate that has been left in place because of its historical significance. Photographs of bulkhead construction are provided in Appendix B.

2.1.5 Vent Raise Grouting

The vent raise was filled with grout from the top of the bulkhead to 10 feet below ground surface. Vertical vent piping that was still present within the vent raise was also filled with grout. A 10-foot-thick concrete cap was placed from the top of the grout plug, to the ground surface.

2.2 DEVIATIONS FROM THE FACILITY CLOSURE PLAN AS APPROVED

There were three deviations from the FCP: (1) The M&OC Environmental Compliance staff determined that it was safer not to disturb the asbestos backboards used to support the electrical panels; therefore, these panels were left in place. (2) Asbestos insulation was not removed from water lines because there was no asbestos insulation on the water lines. (3) The bulkhead was constructed of grout rather than fibercrete.

2.3 SITE PLAN/SURVEY PLAN

The final engineering “as-built” drawings of the bulkheads for the T-Tunnel closure are provided in Appendix A.

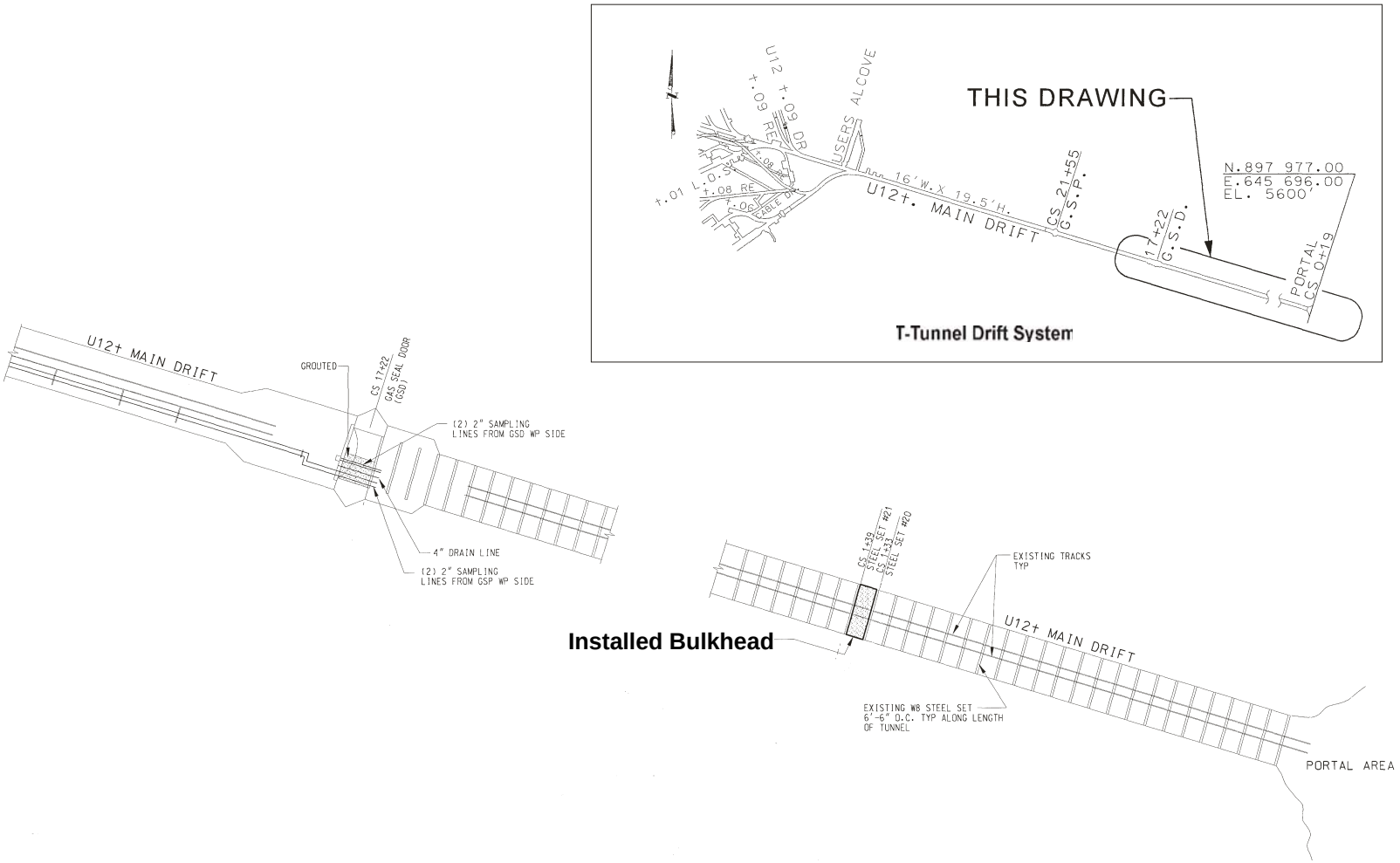


FIGURE 3. LOCATION OF T-TUNNEL BULKHEAD

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3.0 WASTE DISPOSITION

Waste generated from T-Tunnel facility closure activities included non-hazardous material from miscellaneous cleanup and construction activities. All waste was surveyed and managed in accordance with federal and state regulations, U.S. Department of Energy orders, and contractor company procedures. All waste was containerized for proper disposal in the appropriate disposal landfill.

3.1 RADIOACTIVE WASTE (LOW-LEVEL WASTE)

No low-level waste was generated or disposed of during T-Tunnel facility closure activities.

3.2 HAZARDOUS WASTE

No hazardous waste was generated or disposed of during T-Tunnel facility closure activities.

3.3 SANITARY WASTE

Non-hazardous waste, such as sanitary trash and personal protective equipment was disposed of in the NTS Area 23 Sanitary Landfill. Miscellaneous construction debris was disposed of in the NTS Area 9 U10c Sanitary Landfill.

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4.0 FACILITY CLOSURE VERIFICATION RESULTS

Site closure was verified by the following activities:

- The main drift bulkhead design and construction were documented through engineering plans and verified by "as-built" drawings, which are included in Appendix A.
- A site walk-down by DTRA; Stoller-Navarro Joint Venture; National Security Technologies, LLC; NNSA/NSO; and NDEP representatives was performed on February 8, 2007. The consensus of the group was that actions necessary to close the T-Tunnel facility had been adequately completed and the fibercrete bulkhead could be installed. The attendance roster is included in Appendix E.

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5.0 SUMMARY

Closure of the T-Tunnel facility was accomplished by completing the following tasks:

- The tunnel walls and roof were re-lagged where needed to permit safe entry and work within T-Tunnel.
- Miscellaneous debris and old equipment was removed and disposed of, including an oil-filled circuit breaker (reported in the FCP as a transformer), all fire extinguishers, and fluorescent light fixtures.
- Radiologically impacted vent lines were removed and entombed within the T-Tunnel radiologically controlled area.
- The UGTA group was supported during final water sample collection.
- Sample and drain lines were pressure grouted and capped.
- A grout sarcophagus was constructed to entomb all exposed sample collection lines and the drain line and to protect the lines from potential rock fall.
- A full-tunnel cross-section grout bulkhead was constructed to prevent access to the tunnel.
- The vent raise, including vents still located within the vent raise, was filled with grout from the top of the bulkhead to 10 feet below ground surface. A concrete pad was then poured from the top of the grout to the ground surface.

The T-Tunnel facility, including the existing portal gate and remaining structures, has been declared historically significant and as such will remain in place.

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6.0 REFERENCES

NNSA/NSO, see U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office, 2004. *NV/YMP Radiological Control Manual*. DOE/NV/11718--079-Rev 5. Las Vegas, NV.

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APPENDIX A

AS-BUILT DRAWINGS

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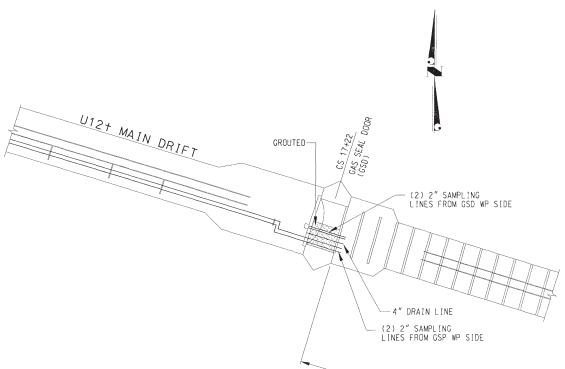

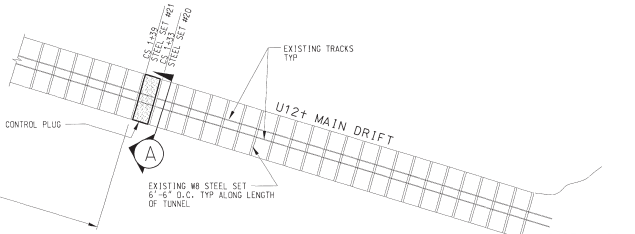

U12t MAIN DRIFT
PARTIAL PLAN @ TUNNEL INVERT

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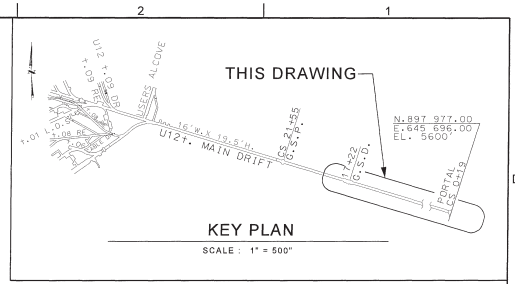
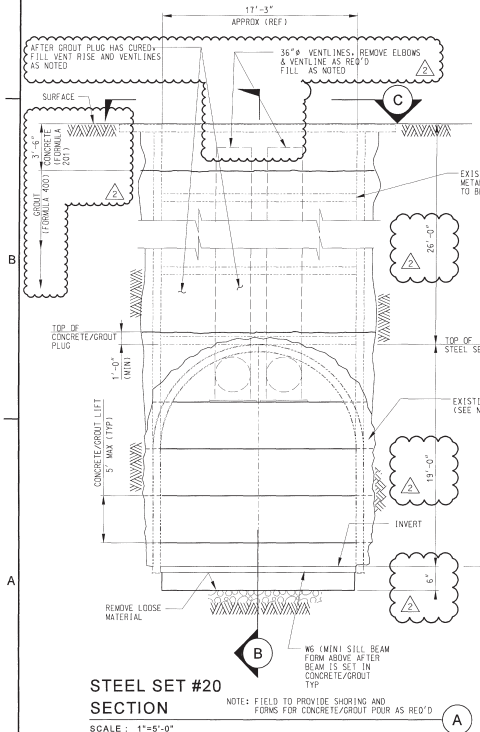


KEY PLAN

SCALE : 1" = 500'

NOTES

1. ALL CONSTRUCTION FEATURES, MATERIALS, TEST, AND DETAILS SHALL CONFORM TO THE NTS STANDARD CONSTRUCTION SPECIFICATIONS, LATEST EDITION.
2. ALL CONCRETE/GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI AND SHALL BE IN ACCORDANCE WITH THE APPROVED NTS CONCRETE MIX DESIGN.
3. REMOVE LAGGING IN PLUG AREA (BETWEEN SET 19 AND SET 22) SCRIBE FORMS TO RIB. FIELD FIT FORMS AS REQ'D AROUND VENT PIPES. SEAL AROUND PERIMETER W/ SULFASET OR FIBERCRETE.
4. INSTALL GROUND SUPPORT AS REQUIRED. FIELD DETERMINE.



STEEL SET #20
SECTION

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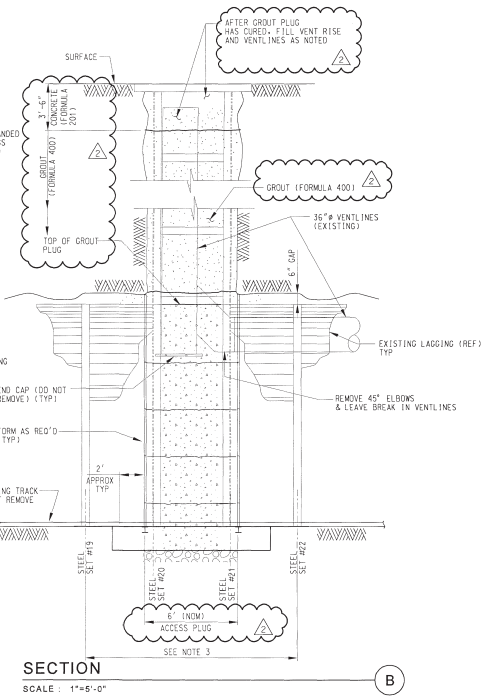

SECTION

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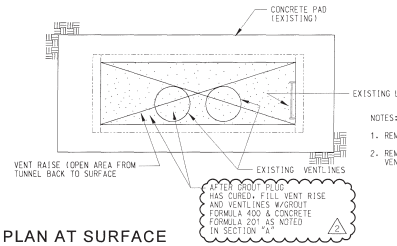

PLAN AT SURFACE

SCALE : 1"=5'-0"

C

NOTES:

1. REMOVE FAN @ COLLAR OF VENTILATION RAISE.
2. REMOVE CHAIN LINK FENCING DIVIDER INSIDE VENTILATION RAISE.

AS-BUILT FROM REV. 1
National Security Technologies
DATE: 5-27-08 BY: [signature]
APPROVED: [signature] 6/4/08

GRAPHIC SCALE
0 5 10 15 FEET
1" = 5'

GRAPHIC SCALE
0 10 20 40 60 FEET
1" = 20'

GS

NO	DATE	REVISIONS	DESIGNED	CHECKED	ENGIN GROUP SUPVR	PROJ ENGR	APPROVER	DERIVATIVE CLASSIFIER
2	6/4/08	REVISED TO REFLECT AS-BUILT CONDITIONS INCORPORATED FCN 07-0180	NA	RC	N/A	RC	RAH	
1	2/05/07	REVISED TO REFLECT UPDATED DESIGN REQUIREMENTS	DAB	RC	OSF	OSF	OSF	RAH
0	9/27/06	ISSUED FOR CONSTRUCTION						

NATIONAL NUCLEAR SECURITY ADMINISTRATION
NEVADA SITE OFFICE — LAS VEGAS, NEVADA

NEVADA TEST SITE — AREA 12

U12t
CLOSURE SUPPORT WORK
LAGGING REPLACEMENT & NEW ACCESS PLUG
PLAN & SECTIONS

DESIGNED	CHECKED	ENGIN GROUP SUPVR	PROJECT ENGINEER	APPROVER	D.C.
A QURESHI 9/25/06	R CACCAVALE 9/25/06	R McCAMANT 9/25/06	J SOROLA 9/27/06	W GRIFFIN 9/25/06	RAH 9/21/06

National Security Technologies LLC
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ENGINEERING NO. 06065.A06 | SHEET 1 OF 1 | DRAWING NUMBER / WORK ORDER NUMBER US-012-U12t-S109 | ORIGINAL SIGNATURES ON FILE | REVISION 2

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APPENDIX B

CLOSURE PHOTOGRAPHS

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PHOTOGRAPH LOG

Photo Number	Date	Description
1	01/26/2006	View inside T-Tunnel indicating poor condition of existing lagging and rock falls within tunnel
2	09/12/2006	View of area where lagging was replaced
3	01/26/2006	Sample and drain lines on portal side of Gas Sample Door (GSD), to the right side of the portal. Lines penetrate GSD on left side. Piping from left side is visible in lower left corner of photo.
4	01/26/2006	Sample and drain lines penetrating GSD on left side of GSD. Gas Seal Plug (GSP) main and alternate sample lines on left, GSD sample lines on right, and drain line in middle
5	01/26/2006	GSP sample lines and drain line
6	01/26/2006	Drain line and GSD sample lines
7	10/18/2006	Pressure-testing the sample lines to verify they are airtight to be filled under pressure with grout. Extraneous piping to the right side of the tunnel has been disconnected. Remaining piping has been extended upward to permit pressure grouting.
8	10/25/2006	Area around sample and drain lines sandbagged for sarcophagus concrete pour
9	10/25/2006	Sample and drain lines sticking up out of partial sarcophagus
10	01/10/2007	Sample and drain lines prepared for pressurized grouting
11	01/10/2007	Grout pumps (right side of photo) used to fill sample and drain lines
12	01/10/2007	GSP sample lines, grout-filled
13	01/10/2007	GSP sample lines, capped
14	01/10/2007	GSD sample lines, grout-filled
15	01/10/2007	GSD sample lines, capped
16	01/11/2007	Form erected for sarcophagus completion
17	01/11/2007	Completed sarcophagus
18	02/21/2007	Vent piping from top of vent raise (at right) being covered to prevent spread of radioactive contamination
19	02/21/2007	Covered vent raise piping being removed
20	02/21/2007	Additional vent raise piping being covered and removed
21	02/21/2007	Removed vent raise piping in Radioactive Material Area pending transfer to tunnel
22	02/21/2007	Top of vent raise after vent piping has been removed
23	02/26/2007	Bottom of vent raise piping, inside T-Tunnel
24	02/28/2007	Vent raise piping disconnected from tunnel vent piping and covered to prevent spread of radioactive contamination
25	02/28/2007	View up vent raise from within T-Tunnel
26	03/01/2007	Base framing for bulkhead, beneath the vent raise
27	03/01/2007	Hauling in concrete for the bulkhead base
28	03/01/2007	Bulkhead concrete base
29	03/06/2007	Bulkhead framing

PHOTOGRAPH LOG (continued)

Photo Number	Date	Description
30	03/13/2007	Bulkhead framing
31	03/15/2007	Bulkhead framing
32	03/15/2007	Bulkhead framing with metal sheeting
33	03/15/2007	Bulkhead frame with metal sheeting against tunnel wall
34	03/21/2007	Bulkhead framing and sheeting, view into tunnel
35	03/22/2007	Bulkhead framing and sheeting, view out of tunnel
36	04/09/2007	Bulkhead with fibercrete application in process
37	04/09/2007	Bulkhead with fibercrete application in process
38	05/08/2007	Bulkhead with fibercrete application in process
39	05/09/2007	Bulkhead with fibercrete application in process
40	06/14/2007	Completed bulkhead
41	06/14/2007	Underground Radioactive Material sign affixed to bulkhead
42	05/14/2007	Grout pour into vent raise
43	05/17/2007	Partially grout-filled vent raise
44	05/17/2007	Partially grout-filled vent raise
45	05/24/2007	Vent raise almost filled with concrete
46	05/24/2007	Vent raise completely filled and finished

Photograph 1: View inside T-Tunnel indicating poor condition of existing lagging and rock falls within tunnel, 01/26/2006

Photograph 2: View of area where lagging was replaced, 09/12/2006

Photograph 3: Sample and drain lines on portal side of Gas Sample Door (GSD), to the right side of the portal. Lines penetrate GSD on left side. Piping from left side is visible in lower left corner of photo. 01/26/2006

Photograph 4: Sample and drain lines penetrating GSD on left side of GSD. Gas Seal Plug (GSP) main and alternate sample lines on left, GSD sample lines on right, and drain line in middle, 01/26/2006

Photograph 5: GSP sample lines and drain line, 01/26/2006

Photograph 6: Drain line and GSD sample lines, 01/26/2006

Photograph 7: Pressure-testing the sample lines to verify they are airtight to be filled under pressure with grout. Extraneous piping to the right side of the tunnel has been disconnected. Remaining piping has been extended upward to permit pressure grouting. 10/18/2006

Photograph 8: Area around sample and drain lines sandbagged for sarcophagus concrete pour, 10/25/2006

Photograph 9: Sample and drain lines sticking up out of partial sarcophagus, 10/25/2006

Photograph 10: Sample and drain lines prepared for pressurized grouting, 01/10/2007

Photograph 11: Grout pumps (right side of photo) used to fill sample and drain lines, 01/10/2007

Photograph 12: GSP sample lines, grout-filled, 01/10/2007

Photograph 13: GSP sample lines, capped, 01/10/2007

Photograph 14: GSD sample lines, grout-filled, 01/10/2007

Photograph 15: GSD sample lines, capped, 01/10/2007

Photograph 16: Form erected for sarcophagus completion, 01/11/2007

Photograph 17: Completed sarcophagus, 01/11/2007

Photograph 18: Vent piping from top of vent raise (at right) being covered to prevent spread of radioactive contamination, 02/21/2007

Photograph 19: Covered vent raise piping being removed, 02/21/2007

Photograph 20: Additional vent raise piping being covered and removed, 02/21/2007

Photograph 21: Removed vent raise piping in Radioactive Material Area pending transfer to tunnel, 02/21/2007

Photograph 22: Top of vent raise after vent piping has been removed, 02/21/2007

Photograph 23: Bottom of vent raise piping, inside T-Tunnel, 02/26/2007

Photograph 24: Vent raise piping disconnected from tunnel vent piping and covered to prevent spread of radioactive contamination, 02/28/2007

Photograph 25: View up vent raise from within T-Tunnel, 02/28/2007

Photograph 26: Base framing for bulkhead, beneath the vent raise, 03/01/2007

Photograph 27: Hauling in concrete for the bulkhead base, 03/01/2007

Photograph 28: Bulkhead concrete base, 03/01/2007

Photograph 29: Bulkhead framing, 03/06/2007

Photograph 30: Bulkhead framing, 03/13/2007

Photograph 31: Bulkhead framing, 03/15/2007

Photograph 32: Bulkhead framing with metal sheeting, 03/15/2007

Photograph 33: Bulkhead frame with metal sheeting against tunnel wall, 03/15/2007

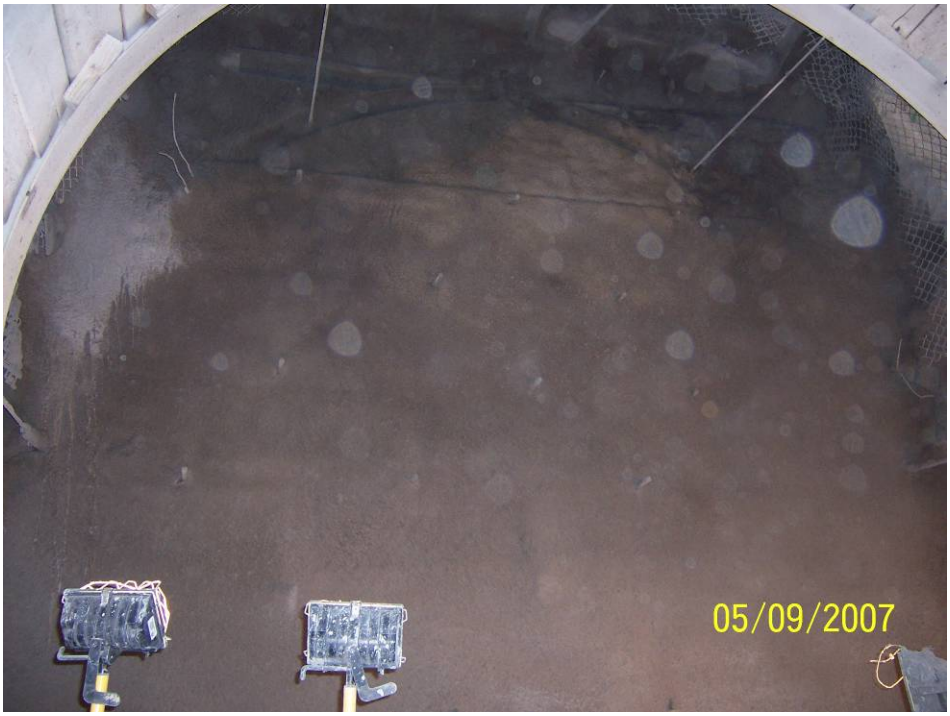
Photograph 34: Bulkhead framing and sheeting, view into tunnel, 03/21/2007

Photograph 35: Bulkhead framing and sheeting, view out of tunnel, 03/22/2007

Photograph 36: Bulkhead with fibercrete application in process, 04/09/2007

Photograph 37: Bulkhead with fibercrete application in process, 04/09/2007

Photograph 38: Bulkhead with fibercrete application in process, 05/08/2007



Photograph 39: Bulkhead with fibercrete application in process, 05/09/2007

Photograph 40: Completed bulkhead, 06/14/2007

Photograph 41: Underground Radioactive Material sign affixed to bulkhead, 06/14/2007

Photograph 42: Grout pour into vent raise, 05/14/2007

Photograph 43: Partially grout-filled vent raise, 05/17/2007

Photograph 44: Partially grout-filled vent raise, 05/17/2007

Photograph 45: Vent raise almost filled with concrete, 05/24/2007

Photograph 46: Vent raise completely filled and finished, 05/24/2007

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APPENDIX C

T-TUNNEL FACILITY CLOSURE PRESSURE TEST FORMS

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Hydrostatic Pressure Testing on U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network (1 of 4) 2"Line

Work Steps (Locate this table and work steps in each work steps location where Pressure Testing is required)

No.	Step	Action/Initials
1	Inspector presence required during Pressure Testing	**Hold Point** Insp/ 10/23/06
2	System to be tested released for Pressure Testing	**Hold Point** RS/ 10-23 RFE/ F.W. Post Dated 10/31/06
3	Perform Required Pressure Testing according OP2110.131 – Pressure Testing of Piping Tubing and Components	Craft/ T 10.23.06 RS/ 10-23

No.	Step	Action/Initials
1	Walk down system. Ensure all flanges, fittings are tight, gaskets installed, Blanks installed. Use Belowground Piping System Checklist and Pipe Support Inspection Checklist.	Craft/ T 10.23.06 RS/ 10-23 RFE/ F.W. Post Dated 10/31/06
2	Install Test Setup including Regulator and connecting points for Test Gauge and Relief Valve	Craft/ T 10.23.06
3	Install Calibrated Test Gauge. Ensure that the maximum test pressure is within 30 to 70 percent of the pressure gauge range. 0-200psig	Craft/ T 10.23.06
4	Install Pressure Relief Device set @ 105% of Test Pressure. 50x1.05=52.5psig	Craft/ T 10.23.06
5	Install Blanks/Caps/Plugs at Test Boundaries for System to be tested. See marked up Drawing (Supplied by RFE)(attach to Pressure Test Data Sheet)	Craft/ T 10.23.06 RFE/ F.W. Post Dated 10/31/06
6	Restrain all expansion joints, if present	Craft/ T 10.23.06
7	Remove and cap or block connections for system components that cannot withstand test pressure. Relief Valves, Filters, Heater and Pumps.	Craft/ T 10.23.06
8	Complete Installation Grout Pipe Line Network in accordance to Pipe Grouting Plan and design drawings; include installation of hose bib	Craft/ T 10.23.06 RFE/ F.W. Post Dated 10/31/06 Insp/ 10/23/06
9	Connect air, water supply to hydrostatic test pump	Craft/ T 10.23.06
10	Block access to or rope off Test area	Craft/ T 10.23.06
11	Notify all personnel in the test area boundaries	RS/ 10-23
12	Notify Inspector's and Field Engineers to witness test	RFE/ F.W. Post Dated 10/31/06
13	Apply pressure to 22.5psig, and inspect for leaks	Craft/ T 10.23.06
14	Vent and repair leaks as necessary	Craft/ T 10.23.06
15	Apply pressure slowly in increments of 10 psig until Test Pressure of 52.5 psig is reached. Observe for leaks	Craft/ T 10.23.06
16	Hold for 10 minutes	Craft/ T 10.23.06
17	Reduce pressure to 22.5 psig	Craft/ T 10.23.06
18	Inspect System for leaks.	Craft/ T 10.23.06 RFE/ F.W. Post Dated 10/31/06
19	Complete Pressure Test Data Sheet	RFE/ F.W. Post Dated 10/31/06
20	After pressure testing is complete drain and vent System	Craft/ T 10.23.06
21	Remove all blanks and caps	Craft/ T 10.23.06
22	Reinstall components removed for tests	Craft/ T 10.23.06
23	Place system in normal shutdown configuration	Craft/ T 10.23.06

4	Pressure Testing Complete	RS/ 10-23 RFE/ F.W. Post Dated 10/31/06 Insp/ 10/31/06

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Pressure Test Data Sheet

TEST NUMBER: One of Four - 2 inch Water Sample Lines	DATE:
PROJECT NUMBER: 06065.A06	PROJECT NAME: U12t Closure Support Work Gas Seal Door Pipe Grouting & Entombment
UNIT/AREA: U12t Tunnel / Area 12	SYSTEM: Grout ~ Sample Line (New) — WORK PACKAGE NUMBER: SOC-07-DTRA-4026

TEST INFORMATION

SYSTEM DESCRIPTION: U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network

DESCRIPTION OF TEST BOUNDARIES: Only Water Sample Lines (include hose bib)

PIPE CLASS: Steel, Brass — DESIGN TEMPERATURE: N/A — DESIGN PRESSURE: Max. 50 P.S.I.

TEST METHOD: ☒ Hydrostatic ☐ Pneumatic ☐ Other (specify)

TEST MEDIUM: Water — APPLICABLE CODE: ANSI/AWWA C605-94

TEST REQUIREMENTS

REQUIRED TEST PRESSURE: 50 P.S.I — TEST TEMPERATURE:

REQUIRED TEST DURATION: 10 Minutes — AMBIENT TEMPERATURE:

GAUGE PRESSURE CALCULATION

	VALUE
Elevation Difference Between Gauge and High Point:	0 feet
Times Factor:	0.4335 psi/ft
Plus Required Test Pressure:	0 psi
Equals Required Gauge Pressure:	0 psi

PRE-TEST REVIEWS

FIELD PIPE ENGINEER: Fred Watson	DATE:	THIRD PARTY/CODE INSPECTOR (IF REQ'D): ~~Leonard Winward~~ IRA GREEN	DATE: 10/23/06
WELDING ENGINEER: N/A	DATE:		

TEST RESULTS

TEST DATE: — START TIME: — FINISH TIME:

ACTUAL GAUGE PRESSURE: 55 PSI — PRESSURE DROP: — IN: PSI

TEST EQUIPMENT

TYPE: Hydrostatic Pump	ID: TELEDYNE SPRAGUE	RANGE: 0-600	CAL. DATE: 3/28/06	CAL. DUE: 3/28/07
TYPE: Calibrated Guage	ID: 53194-1	RANGE: 0-100	CAL. DATE: 3/2/06	CAL. DUE: 3/2/07
TYPE: Pressure Relief Valve	ID: N/A	RANGE:	CAL. DATE:	CAL. DUE:

REMARKS: PRESSURE RELIEF VALVE PRESET TO 52.5 PSI

TEST ACCEPTANCE

FIELD ENGINEER: Fred Watson — Fred Watson — DATE: Post Dated 10/30/06

THIRD PARTY/CODE INSPECTOR: ~~Leonard Winward~~ IRA GREEN — Ira P. Green — DATE: 10/23/06

OWNER REPRESENTATIVE N/A — DATE:

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Hydrostatic Pressure Testing on U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network (2 of 4) 2"Line

Work Steps (Locate this table and work steps in each work steps location where Pressure Testing is required)

No.	Step	Action/Initials
1	Inspector presence required during Pressure Testing	**Hold Point** Insp/ 10/23/06
2	System to be tested released for Pressure Testing	**Hold Point** RS/ 10-23-06 RFE/ fw. Post Dated 10/23/06
3	Perform Required Pressure Testing according OP2110.131 – Pressure Testing of Piping Tubing and Components	Craft/ T 10-23-06 RS/ 10-23-06

No.	Step	Action/Initials
1	Walk down system. Ensure all flanges, fittings are tight, gaskets installed, Blanks installed. Use Belowground Piping System Checklist and Pipe Support Inspection Checklist.	Craft/ T 10-23-06 RS/ 10-23 RFE/ fw. Post Dated 10/23/06
2	Install Test Setup including Regulator and connecting points for Test Gauge and Relief Valve	Craft/ T 10-23-06
3	Install Calibrated Test Gauge. Ensure that the maximum test pressure is within 30 to 70 percent of the pressure gauge range. 0-200psig	Craft/ T 10-23-06
4	Install Pressure Relief Device set @ 105% of Test Pressure. 50x1.05=52.5psig	Craft/ T 10-23-06
5	Install Blanks/Caps/Plugs at Test Boundaries for System to be tested. See marked up Drawing (Supplied by RFE)(attach to Pressure Test Data Sheet)	Craft/ T 10-23-06 RFE/ fw. Post Dated 10/23/06
6	Restrain all expansion joints, if present	Craft/ T 10-23-06
7	Remove and cap or block connections for system components that cannot withstand test pressure. Relief Valves, Filters, Heater and Pumps.	Craft/ T 10-23-06
8	Complete Installation Grout Pipe Line Network in accordance to Pipe Grouting Plan and design drawings; include installation of hose bib	Craft/ T 10-23-06 RFE/ fw. Post Dated 10/23/06 Insp/ 10/23/06
9	Connect air, water supply to hydrostatic test pump	Craft/ T 10-23-06
10	Block access to or rope off Test area	Craft/ T 10-23-06
11	Notify all personnel in the test area boundaries	RS/ 10-23
12	Notify Inspector's and Field Engineers to witness test	RFE/ fw. Post Dated 10/23/06
13	Apply pressure to 22.5psig, and inspect for leaks	Craft/ T 10-23-06
14	Vent and repair leaks as necessary	Craft/ T 10-23-06
15	Apply pressure slowly in increments of 10 psig until Test Pressure of 52.5 psig is reached. Observe for leaks	Craft/ T 10-23-06
16	Hold for 10 minutes	Craft/ T 10-23-06
17	Reduce pressure to 22.5 psig	Craft/ T 10-23-06
18	Inspect System for leaks.	Craft/ T 10-23-06 RFE/ fw. Post Dated 10/23/06
19	Complete Pressure Test Data Sheet	RFE/ fw. Post Dated 10/23/06
20	After pressure testing is complete drain and vent System	Craft/ T 10-23-06
21	Remove all blanks and caps	Craft/ T 10-23-06
22	Reinstall components removed for tests	Craft/ T 10-23-06
23	Place system in normal shutdown configuration	Craft/ T 10-23-06

4	Pressure Testing Complete	RS/ RFE/ fw. Post Dated 10/23/06 Insp/ 10/23/06

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Pressure Test Data Sheet

TEST NUMBER: Two of Four - 2 inch Water Sample Lines	DATE:
PROJECT NUMBER: 06065.A06	PROJECT NAME: U12t Closure Support Work Gas Seal Door Pipe Grouting & Entombment
UNIT/AREA: U12t Tunnel / Area 12	SYSTEM: Grout ~ Sample Line (New) — WORK PACKAGE NUMBER: SOC-07-DTRA-4026

TEST INFORMATION

SYSTEM DESCRIPTION: U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network	
DESCRIPTION OF TEST BOUNDARIES: Only Water Sample Lines (include hose bib)	
PIPE CLASS: Steel, Brass	DESIGN TEMPERATURE: N/A — DESIGN PRESSURE: Max. 50 P.S.I.
TEST METHOD: ☒ Hydrostatic ☐ Pneumatic ☐ Other (specify)	
TEST MEDIUM: Water	APPLICABLE CODE: ANSI/AWWA C605-94

TEST REQUIREMENTS

REQUIRED TEST PRESSURE: 50 P.S.I	TEST TEMPERATURE:
REQUIRED TEST DURATION: 10 Minutes	AMBIENT TEMPERATURE:

GAUGE PRESSURE CALCULATION

	VALUE
Elevation Difference Between Gauge and High Point:	0 feet
Times Factor:	0.4335 psi/ft
Plus Required Test Pressure:	0 psi
Equals Required Gauge Pressure:	0 psi

PRE-TEST REVIEWS

FIELD PIPE ENGINEER: Fred Watson	DATE:	THIRD PARTY/CODE INSPECTOR (IF REQ'D): ~~Leonard Wieward~~ IRA GREEN	DATE: 10/23/06
WELDING ENGINEER: N/A	DATE:		

TEST RESULTS

TEST DATE:	START TIME:	FINISH TIME:
ACTUAL GAUGE PRESSURE: 50 PSI	PRESSURE DROP:	IN: PSI

TEST EQUIPMENT

TYPE: Hydrostatic Pump	ID: TELEDYNE SPRAGUE	RANGE: 0-600	CAL. DATE: 3/28/06	CAL. DUE: 3/28/07
TYPE: Calibrated Guage	ID: 53018-1	RANGE: 0-100	CAL. DATE: 2/28/06	CAL. DUE: 2/28/07
TYPE: Pressure Relief Valve	ID: N/A	RANGE:	CAL. DATE:	CAL. DUE:

REMARKS: PRESSURE RELIEF VALVE PRESET TO 52.5 PSI

TEST ACCEPTANCE

FIELD ENGINEER: Fred Watson	Fred Watson	DATE: Post Dated 10/30/06
THIRD PARTY/CODE INSPECTOR: ~~Leonard Wilward~~ IRA GREEN	Ira P. Green	DATE: 10/23/06
OWNER REPRESENTATIVE N/A		DATE:

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Hydrostatic Pressure Testing on U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network (3 of 4) 2"Line

Work Steps (Locate this table and work steps in each work steps location where Pressure Testing is required)

No.	Step	Action/Initials
1	Inspector presence required during Pressure Testing	**Hold Point** Insp/ 10/24/06
2	System to be tested released for Pressure Testing	**Hold Point** RS/ 10-24-06 RFE/ f.w. Post Dated 10/31/06
3	Perform Required Pressure Testing according OP2110.131 – Pressure Testing of Piping Tubing and Components	Craft/ T 10.24-06 RS/ 10-24-06

No.	Step	Action/Initials
1	Walk down system. Ensure all flanges, fittings are tight, gaskets installed, Blanks installed. Use Belowground Piping System Checklist and Pipe Support Inspection Checklist.	Craft/ T 10-29-06 RS/ 10-24-06 RFE/ f.w. Post Dated 10/31/06
2	Install Test Setup including Regulator and connecting points for Test Gauge and Relief Valve	Craft/ T 10-29-06
3	Install Calibrated Test Gauge. Ensure that the maximum test pressure is within 30 to 70 percent of the pressure gauge range. 0-200psig	Craft/ T 10-29-06
4	Install Pressure Relief Device set @ 105% of Test Pressure. 50x1.05=52.5psig	Craft/ T 10-29-06
5	Install Blanks/Caps/Plugs at Test Boundaries for System to be tested. See marked up Drawing (Supplied by RFE)(attach to Pressure Test Data Sheet)	Craft/ T 10-29-06 RFE/ f.w. Post Dated 10/31/06
6	Restrain all expansion joints, if present	Craft/ T 10-29-06
7	Remove and cap or block connections for system components that cannot withstand test pressure. Relief Valves, Filters, Heater and Pumps.	Craft/ T 10-29-06
8	Complete Installation Grout Pipe Line Network in accordance to Pipe Grouting Plan and design drawings; include installation of hose bib	Craft/ T 10-29-06 RFE/ f.w. Post Dated 10/31/06 Insp/ 10/24/06
9	Connect air, water supply to hydrostatic test pump	Craft/ T 10-29-06
10	Block access to or rope off Test area	Craft/ T 10-29-06
11	Notify all personnel in the test area boundaries	RS/ 10-24-06
12	Notify Inspector's and Field Engineers to witness test	RFE/ f.w. Post Dated 10/31/06
13	Apply pressure to 22.5psig, and inspect for leaks	Craft/ T 10-29-06
14	Vent and repair leaks as necessary	Craft/ T 10-29-06
15	Apply pressure slowly in increments of 10 psig until Test Pressure of 52.5 psig is reached. Observe for leaks	Craft/ T 10-29-06
16	Hold for 10 minutes	Craft/ T 10-29-06
17	Reduce pressure to 22.5 psig	Craft/ T 10-29-06
18	Inspect System for leaks.	Craft/ T 10-29-06 RFE/ f.w. Post Dated 10/31/06
19	Complete Pressure Test Data Sheet	RFE/ f.w. Post Dated 10/31/06
20	After pressure testing is complete drain and vent System	Craft/ T 10-29-06
21	Remove all blanks and caps	Craft/ T 10-29-06
22	Reinstall components removed for tests	Craft/ T 10-29-06
23	Place system in normal shutdown configuration	Craft/ T 10-29-06

4	Pressure Testing Complete	RS/ 10-24-06 RFE/ f.w. Post Dated 10/31/06 Insp/ 10/31/06

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Pressure Test Data Sheet

TEST NUMBER: Three of Four - 2 inch Water Sample Lines	DATE:
PROJECT NUMBER: 06065.A06	PROJECT NAME: U12t Closure Support Work Gas Seal Door Pipe Grouting & Entombment
UNIT/AREA: U12t Tunnel / Area 12	SYSTEM: Grout ~ Sample Line (New) — WORK PACKAGE NUMBER: SOC-07-DTRA-4026

TEST INFORMATION

SYSTEM DESCRIPTION: U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network

DESCRIPTION OF TEST BOUNDARIES: Only Water Sample Lines (include hose bib)

PIPE CLASS: Steel, Brass — DESIGN TEMPERATURE: N/A — DESIGN PRESSURE: Max. 50 P.S.I.

TEST METHOD: ☒ Hydrostatic ☐ Pneumatic ☐ Other (specify)

TEST MEDIUM: Water — APPLICABLE CODE: ANSI/AWWA C605-94

TEST REQUIREMENTS

REQUIRED TEST PRESSURE: 50 P.S.I — TEST TEMPERATURE:

REQUIRED TEST DURATION: 10 Minutes — AMBIENT TEMPERATURE:

GAUGE PRESSURE CALCULATION

	VALUE
Elevation Difference Between Gauge and High Point:	0 feet
Times Factor:	0.4335 psi/ft
Plus Required Test Pressure:	0 psi
Equals Required Gauge Pressure:	0 psi

PRE-TEST REVIEWS

FIELD PIPE ENGINEER: Fred Watson	DATE:	THIRD PARTY/CODE INSPECTOR (IF REQ'D): ~~Leonard Winward~~ IRA GREEN	DATE: 10/24/06
WELDING ENGINEER: N/A	DATE:		

TEST RESULTS

TEST DATE: — START TIME: — FINISH TIME:

ACTUAL GAUGE PRESSURE: 52 PSI — PRESSURE DROP: — IN: PSI

TEST EQUIPMENT

TYPE: Hydrostatic Pump	ID: TELEDYNE SPRAGUE	RANGE: 0-600	CAL. DATE: 6/28/06	CAL. DUE: 6/28/07
TYPE: Calibrated Guage	ID: 001064	RANGE: 0-100	CAL. DATE: 1/17/06	CAL. DUE: 1/17/07
TYPE: Pressure Relief Valve	ID: N/A	RANGE:	CAL. DATE:	CAL. DUE:

REMARKS: PRESSURE RELIEF VALVE PRESET TO 52.5 PSI

TEST ACCEPTANCE

FIELD ENGINEER: Fred Watson — Fred Watson — DATE: Post Dated 10/31/06

THIRD PARTY/CODE INSPECTOR: ~~Leonard Winward~~ IRA GREEN — Ira P Green — DATE: 10/24/06

OWNER REPRESENTATIVE N/A — DATE:

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Hydrostatic Pressure Testing on U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network (4 of 4) 2"Line

Work Steps (Locate this table and work steps in each work steps location where Pressure Testing is required)

No.	Step	Action/Initials
1	Inspector presence required during Pressure Testing	**Hold Point** Insp/ 10/24/06
2	System to be tested released for Pressure Testing	**Hold Point** RS/ 10-24-06 RFE/ F.W. Post Dated 10/30/06
3	Perform Required Pressure Testing according OP2110.131 – Pressure Testing of Piping Tubing and Components	Craft/ T 10-24-06 RS/ 10-24-06

No.	Step	Action/Initials
1	Walk down system. Ensure all flanges, fittings are tight, gaskets installed, Blanks installed. Use Belowground Piping System Checklist and Pipe Support Inspection Checklist.	Craft/ T 10-24-06 RS/ 10-24-06 RFE/ F.W. Post Dated 10/30/06
2	Install Test Setup including Regulator and connecting points for Test Gauge and Relief Valve	Craft/ T 10-24-06
3	Install Calibrated Test Gauge. Ensure that the maximum test pressure is within 30 to 70 percent of the pressure gauge range. 0-200psig	Craft/ T 10-24-06
4	Install Pressure Relief Device set @ 105% of Test Pressure. 50x1.05=52.5psig	Craft/ T 10-24-06
5	Install Blanks/Caps/Plugs at Test Boundaries for System to be tested. See marked up Drawing (Supplied by RFE)(attach to Pressure Test Data Sheet)	Craft/ T 10-24-06 RFE/ F.W. Post Dated 10/30/06
6	Restrain all expansion joints, if present	Craft/ T 10-24-06
7	Remove and cap or block connections for system components that cannot withstand test pressure. Relief Valves, Filters, Heater and Pumps.	Craft/ T 10-24-06
8	Complete Installation Grout Pipe Line Network in accordance to Pipe Grouting Plan and design drawings; include installation of hose bib	Craft/ T 10-24-06 RFE/ F.W. Post Dated 10/30/06 Insp/ 10/24/06
9	Connect air, water supply to hydrostatic test pump	Craft/ T 10-24-06
10	Block access to or rope off Test area	Craft/ T 10-24-06
11	Notify all personnel in the test area boundaries	RS/ 10-24-06
12	Notify Inspector's and Field Engineers to witness test	RFE/ F.W. Post Dated 10/30/06
13	Apply pressure to 22.5psig, and inspect for leaks	Craft/ T 10-24-06
14	Vent and repair leaks as necessary	Craft/ T 10-24-06
15	Apply pressure slowly in increments of 10 psig until Test Pressure of 52.5 psig is reached. Observe for leaks	Craft/ T 10-24-06
16	Hold for 10 minutes	Craft/ T 10-24-06
17	Reduce pressure to 22.5 psig	Craft/ T 10-24-06
18	Inspect System for leaks.	Craft/ T 10-24-06 RFE/ F.W. Post Dated 10/30/06
19	Complete Pressure Test Data Sheet	RFE/ F.W. Post Dated 10/30/06
20	After pressure testing is complete drain and vent System	Craft/ T 10-24-06
21	Remove all blanks and caps	Craft/ T 10-24-06
22	Reinstall components removed for tests	Craft/ T 10-24-06
23	Place system in normal shutdown configuration	Craft/ T 10-24-06

4	Pressure Testing Complete	RS/ 10-24-06 RFE/ F.W. Post Dated 10/30/06 Insp/ 10/31/06

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Pressure Test Data Sheet

TEST NUMBER: Four of Four - 2 inch Water Sample Lines DATE:

PROJECT NUMBER: 06065.A06 PROJECT NAME: U12t Closure Support Work Gas Seal Door Pipe Grouting & Entombment

UNIT/AREA: U12t Tunnel / Area 12 SYSTEM: Grout ~ Sample Line (New) WORK PACKAGE NUMBER: SOC-07-DTRA-4026

TEST INFORMATION

SYSTEM DESCRIPTION: U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network

DESCRIPTION OF TEST BOUNDARIES: Only Water Sample Lines (include hose bib)

PIPE CLASS: Steel, Brass DESIGN TEMPERATURE: N/A DESIGN PRESSURE: Max. 50 P.S.I.

TEST METHOD: ☒ Hydrostatic ☐ Pneumatic ☐ Other (specify)

TEST MEDIUM: Water APPLICABLE CODE: ANSI/AWWA C605-94

TEST REQUIREMENTS

REQUIRED TEST PRESSURE: 50 P.S.I TEST TEMPERATURE:

REQUIRED TEST DURATION: 10 Minutes AMBIENT TEMPERATURE:

GAUGE PRESSURE CALCULATION

	VALUE
Elevation Difference Between Gauge and High Point:	0 feet
Times Factor:	0.4335 psi/ft
Plus Required Test Pressure:	0 psi
Equals Required Gauge Pressure:	0 psi

PRE-TEST REVIEWS

FIELD PIPE ENGINEER: Fred Watson DATE:

THIRD PARTY/CODE INSPECTOR (IF REQ'D): ~~Leonard Wayward~~ IRA GREEN DATE: 10/24/06

WELDING ENGINEER: N/A DATE:

TEST RESULTS

TEST DATE: START TIME: FINISH TIME:

ACTUAL GAUGE PRESSURE: 60 PSI PRESSURE DROP: IN: PSI

TEST EQUIPMENT

TYPE: Hydrostatic Pump ID: TELEDYNE SPRAGUE RANGE: 0-600 CAL. DATE: 6/28/06 CAL. DUE: 6/28/07

TYPE: Calibrated Guage ID: 001064 RANGE: 0-100 CAL. DATE: 11/7/06 CAL. DUE: 11/7/07

TYPE: Pressure Relief Valve ID: N/A RANGE: CAL. DATE: CAL. DUE:

REMARKS: PRESSURE RELIEF VALVE PRESET TO 52.5 PSI

TEST ACCEPTANCE

FIELD ENGINEER: Fred Watson Fred Watson DATE: Post Dated 10/30/06

THIRD PARTY/CODE INSPECTOR: ~~Leonard Wayward~~ IRA GREEN! Ira P Green DATE: 10/24/06

OWNER REPRESENTATIVE N/A DATE:

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(1 of 1)

Hydrostatic Pressure Testing on U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network (1 of 4) 4"Line

Work Steps (Locate this table and work steps in each work steps location where Pressure Testing is required)

No.	Step	Action/Initials
1	Inspector presence required during Pressure Testing	**Hold Point** Insp/ 10/24/06
2	System to be tested released for Pressure Testing	**Hold Point** RS/ 10-26-06 RFE/ F.W. Post Dated 10/30/06
3	Perform Required Pressure Testing according OP2110.131 – Pressure Testing of Piping Tubing and Components	Craft/ T 10.24.06 RS/ 10-26-06

No.	Step	Action/Initials
1	Walk down system. Ensure all flanges, fittings are tight, gaskets installed, Blanks installed. Use Belowground Piping System Checklist and Pipe Support Inspection Checklist.	Craft/ T 10-29-06 RS/ 10-26-06 RFE/ F.W. Post Dated 10/30/06
2	Install Test Setup including Regulator and connecting points for Test Gauge and Relief Valve	Craft/ T 10-24-06
3	Install Calibrated Test Gauge. Ensure that the maximum test pressure is within 30 to 70 percent of the pressure gauge range. 0-200psig	Craft/ T 10-24-06
4	Install Pressure Relief Device set @ 105% of Test Pressure. 50x1.05=52.5psig	Craft/ T 10-24-06
5	Install Blanks/Caps/Plugs at Test Boundaries for System to be tested. See marked up Drawing (Supplied by RFE)(attach to Pressure Test Data Sheet)	Craft/ T 10-29-06 RFE/ F.W. Post Dated 10/30/06
6	Restrain all expansion joints, if present	Craft/ T 10-24-06
7	Remove and cap or block connections for system components that cannot withstand test pressure. Relief Valves, Filters, Heater and Pumps.	Craft/ T 10-24-06
8	Complete Installation Grout Pipe Line Network in accordance to Pipe Grouting Plan and design drawings; include installation of hose bib	Craft/ T 10-29-06 RFE/ F.W. Post Dated 10/30/06 Insp/ 10/29/06
9	Connect air, water supply to hydrostatic test pump	Craft/ T 10-24-06
10	Block access to or rope off Test area	Craft/ T 10-24-06
11	Notify all personnel in the test area boundaries	RS/ 10-26-06
12	Notify Inspector's and Field Engineers to witness test	RFE/ F.W. Post Dated 10/30/06
13	Apply pressure to 22.5psig, and inspect for leaks	Craft/ T 10-24-06
14	Vent and repair leaks as necessary	Craft/ T 10-24-06
15	Apply pressure slowly in increments of 10 psig until Test Pressure of 52.5 psig is reached. Observe for leaks	Craft/ T 10-24-06
16	Hold for 10 minutes	Craft/ T 10-24-06
17	Reduce pressure to 22.5 psig	Craft/ T 10-29-06
18	Inspect System for leaks.	Craft/ T 10-24-06 RFE/ F.W. Post Dated 10/30/06
19	Complete Pressure Test Data Sheet	RFE/ F.W. Post Dated 10/30/06
20	After pressure testing is complete drain and vent System	Craft/ T 10-24-06
21	Remove all blanks and caps	Craft/ T 10-24-06
22	Reinstall components removed for tests	Craft/ T 10-24-06
23	Place system in normal shutdown configuration	Craft/ T 10-24-06

4	Pressure Testing Complete	RS/ 10-26-06 RFE/ F.W. Post Dated 10/30/06 Insp/ 10/29/06

National Security Technologies LLC

Pressure Test Data Sheet

TEST NUMBER: One of One - 4 inch Drain Line	DATE:
PROJECT NUMBER: 06065.A06	PROJECT NAME: U12t Closure Support Work Gas Seal Door Pipe Grouting & Entombment
UNIT/AREA: U12t Tunnel / Area 12	SYSTEM: Grout ~ Sample Line (New) — WORK PACKAGE NUMBER: SOC-07-DTRA-4026

TEST INFORMATION

SYSTEM DESCRIPTION: U12t GSD Grout Pipe Line Network ~ Sample Pipe Line Network

DESCRIPTION OF TEST BOUNDARIES: Only Water Sample Lines (include hose bib)

PIPE CLASS: Steel, Brass — DESIGN TEMPERATURE: N/A — DESIGN PRESSURE: Max. 50 P.S.I.

TEST METHOD: ☒ Hydrostatic ☐ Pneumatic ☐ Other (specify)

TEST MEDIUM: Water — APPLICABLE CODE: ANSI/AWWA C605-94

TEST REQUIREMENTS

REQUIRED TEST PRESSURE: 50 P.S.I — TEST TEMPERATURE:

REQUIRED TEST DURATION: 10 Minutes — AMBIENT TEMPERATURE:

GAUGE PRESSURE CALCULATION

	VALUE
Elevation Difference Between Gauge and High Point:	0 feet
Times Factor:	0.4335 psi/ft
Plus Required Test Pressure:	0 psi
Equals Required Gauge Pressure:	0 psi

PRE-TEST REVIEWS

FIELD PIPE ENGINEER: Fred Watson	DATE:	THIRD PARTY/CODE INSPECTOR (IF REQ'D): ~~Leonard Winward~~ IRA GREEN	DATE: 10/24/06
WELDING ENGINEER: N/A	DATE:		

TEST RESULTS

TEST DATE: — START TIME: — FINISH TIME:

ACTUAL GAUGE PRESSURE: 57 PSI — PRESSURE DROP: — IN: PSI

TEST EQUIPMENT

TYPE: Hydrostatic Pump	ID: TELEDYNE SPRAGUE	RANGE: 0-600	CAL. DATE: 3/29/06	CAL. DUE: 3/28/07
TYPE: Calibrated Guage	ID: 061064	RANGE: 0-100	CAL. DATE: 1/17/06	CAL. DUE: 1/17/07
TYPE: Pressure Relief Valve	ID: N/A	RANGE:	CAL. DATE:	CAL. DUE:

REMARKS: PRESSURE RELIEF VALVE PREGET TO 52.5 PSI

TEST ACCEPTANCE

FIELD ENGINEER: Fred Watson — Fred Watson — DATE: Post Dated 10/30/06

THIRD PARTY/CODE INSPECTOR: ~~Leonard Winward~~ IRA GREEN — DATE: 10/24/06

OWNER REPRESENTATIVE N/A — DATE:

NSTec
Concrete Pour Card

RECORD NUMBER: A-12-0005		**DATE:** January 10, 2007
PROJECT NUMBER 06065.A06	**PROJECT NAME:** : Concrete/Grout U12t Tunnel Drain & Sample Lines	
CONTRACTOR NAME: N/A		**POUR DATE:** January 11, 2007
POUR IDENTIFICATION: Area 12, U12t Tunnel		**POUR QUANTITY:** 6 yrds
SYSTEM:		**WORK PACKAGE:** 4026
REFERENCE DOCUMENT NO.	**REV. NO.**	**REMARKS** (list applicable FCR, DCN, etc.)
JS-012-U12t-M15	0	
MIX DESIGN NUMBER: 103		**ALLOWABLE SLUMP RANGE:** 4 inches
DESIGN STRENGTH: 5,000 psi		**MAXIMUM AGGREGATE SIZE:** ¾ inch
PLACING METHOD: LHD bucket		**ALLOWABLE POUR RATE:** N/A
CURING METHOD: None		**FINISH:** None

PRE-PLACEMENT CHECKLIST	INITIAL	DATE	INITIAL	DATE	N/A
Subgrade (top of previous concrete placement)	F.W.				☐
Formwork (sandbags)	F.W.				☐
Line and grade					N/A
Reinforcing					☒
Embedded items:					☐
2 inch steel Pipe & Valve (total of four)	F.W.				☐
4 inch steel Pipe & Valve (total of one)	F.W.				☐
					☒
					☒
Inside formwork cleanup					
Other (specify):					☒
Other (specify):					☒
Release for placement	F.W.				

FIELD ENGINEER: FRED WATSON Fred Watson **DATE:** 1/11/07

POST-PLACEMENT CURING CHECKLIST	INITIAL	DATE	INITIAL	DATE	N/A
Proper finish applied – None					☒
Proper curing method applied					☒
Required hot or cold weather protection provided					☒
Cure temperature maintained					N/A
Other (specify):					☒
Other (specify):					☒
Formwork removed Sandbags to remain	F.W.				☐

COMMENTS:

FIELD ENGINEER: FRED WATSON Fred Watson **DATE:** 1/11/07

NSTec
Concrete Pour Card

RECORD NUMBER:			**DATE:** 10/25/06
PROJECT NUMBER 06065.A06		**PROJECT NAME:** : Concrete/Grout U12t Tunnel Drain & Sample Lines	
CONTRACTOR NAME: N/A		**POUR DATE:**	
POUR IDENTIFICATION: Area 12t Tunnel; DTRA		**POUR QUANTITY:**	
SYSTEM:		**WORK PACKAGE:** 4026	
REFERENCE DOCUMENT NO.	**REV. NO.**	**REMARKS** (list applicable FCR, DCN, etc.)	
JS-012-U12t-M15	0		
MIX DESIGN NUMBER:		**ALLOWABLE SLUMP RANGE:**	
DESIGN STRENGTH:		**MAXIMUM AGGREGATE SIZE:**	
PLACING METHOD: ~~Chute~~ LHD bucket		**ALLOWABLE POUR RATE:** N/A	
CURING METHOD: None		**FINISH:** None	

PRE-PLACEMENT CHECKLIST	INITIAL	DATE	INITIAL	DATE	N/A
Subgrade	[illegible]	10-25-06			☐
Formwork (Sandbags)	DAS	10/25/06			☐
Line and grade					N/A
Reinforcing					☒
Embedded items:	DAS	10/25/06			☐
2 inch steel Pipe & Valve	DAS	10/25/06			☐
4 inch steel Pipe & Valve	DAS	10/25/06			☐
					☒
					☒
Inside formwork cleanup	DAS	10/25/06			N/A
Other (specify):					☒
Other (specify):					☒
Release for placement	R. W. Watson DAS	10/25/06			N/A

FIELD ENGINEER: FRED WATSON **DATE:**

POST-PLACEMENT CURING CHECKLIST	INITIAL	DATE	INITIAL	DATE	N/A
Proper finish applied – None					☒
Proper curing method applied					☒
Required hot or cold weather protection provided					☒
Cure temperature maintained					N/A
Other (specify):					☒
Other (specify):					☒
Formwork removed (sandbags to remain)					☐

COMMENTS:

FIELD ENGINEER: FRED WATSON R. Watson **DATE:** 10-25-06

APPENDIX D

FACILITY CLOSURE PLAN FOR N- AND T- TUNNELS, AREA 12, NEVADA TEST SITE

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FACILITY CLOSURE PLAN FOR N- AND T-TUNNELS AREA 12 NEVADA TEST SITE

November 2003

Facility Closure Plan
N- and T- Tunnels
Area 12
Nevada Test Site

Prepared by
Defense Threat Reduction Agency
Nevada Operations Section
Mercury, Nevada

November 2003

Facility Closure Plan
N- and T-Tunnels
Area 12
Nevada Test Site

Submitted by: _____ Date: 2 Dec 03

PAUL M. LOOMIS
LTC, USA
Chief, Nevada Operations Section

1.0 Introduction

This Facility Closure Plan (Plan) has been prepared by the Defense Threat Reduction Agency (DTRA) Environmental, Safety, and Health Group at the Nevada Test Site (NTS). This Plan provides background information about N-Tunnel and T-Tunnel, describes the containment structures (plugs), and outlines the basic procedures for closure of the accessible areas of the tunnels. The Plan does not address short or long-term monitoring of water impounded behind the plugs in the tunnels. This Plan excludes the muckpiles and ponds used to support the tunnel complexes. The muckpiles and ponds will be closed in accordance with (IAW) requirements of the Federal Facility Agreement and Consent Order.

1.1 Purpose

The purpose is to close the accessible tunnel areas between the portals and the Gas Seal Plugs (GSP) at N-Tunnel and between the portal and the Gas Seal Door (GSD) at T-Tunnel and turn ownership and control of these two facilities over to the National Nuclear Security Administration/Nevada Site Office.

1.2 Scope

Scope for the N-Tunnel Facility closure includes:

- Plug the sample collection lines that penetrate the GSPs in the U12n. Main Drift and the U12n. Extension Drift.
- Place a concrete sarcophagus on the portal side of the GSPs to entomb the exposed portions of the sample collection lines and protect them from potential rockfall.
- Close the GSD in the U12n. Main Drift and weld the door to the frame.
- Install a blind flange on each end of the U12n. Extension Drift GSD crawl tube and stem with groutcrete.
- Remove:
    - Oil filled transformer

    - Fire extinguishers
    - Hydraulic fluid
    - Asbestos backboards holding electrical panels
    - Fluorescent light fixtures
- Construct a full tunnel cross-section shotcrete bulkhead near the portal to prevent unauthorized tunnel access.

Scope for the T-Tunnel Facility closure includes:

- Plug the sample collection lines that penetrate the GSD and the GSP in the U12t. Main Drift.
- Place a concrete sarcophagus on the portal side of the GSD to entomb the exposed portions of the sample collection lines and protect them from potential rockfall.
- Remove ventilation line from the vent raise and backfill the vent raise.
- Remove:
    - Oil filled transformer
    - Fire extinguishers
    - Any asbestos insulation from the tunnel water line
    - Fluorescent light fixtures
- Construct a full tunnel cross-section shotcrete bulkhead near the portal to prevent unauthorized tunnel access.

2.0 Facility Description

N and T Tunnel are both located in Area 12 of the NTS. Figure 1 indicates the location of the tunnels within the NTS. The N-Tunnel complex has two parallel access drifts; the U12n. Main drift and the U12n. Extension drift. Each N-Tunnel access drift contains two Nuclear Weapons Effects Tests (NWET) containment structures; a Gas Seal Plug (GSP) and a Gas Seal Door (GSD). The T-Tunnel complex has a single access drift with a GSP and a GSD.

The GSPs and the GSDs were designed and engineered to prevent radioactive gases from escaping to the atmosphere following a NWET. The GSPs are located approximately 2,000 feet from the portal. The GSD in the U12n. Main drift is located approximately 1,700 feet from the portal. The GSD in the U12n. Extension drift is located approximately 1,900 feet from the portal.

2.1 History

N- and T-Tunnel were used for NWET and were operational between 1964 and 1993. The tunnels were excavated horizontally into the volcanic rocks of Rainier Mesa. Groundwater discharged from both tunnels to evaporation ponds throughout most of their operational life. T-Tunnel was mothballed in 1993 by sealing the U12t. Main GSP and the U12T. Main GSD. N-Tunnel was mothballed in 1994 by sealing the U12n. Main drift GSP and the U12n. Extension drift GSPs. The objectives of the mothballing were:

- Preservation of the tunnel for resumption of testing under the Nuclear Treaties Safeguards.
- Eliminate radioactive water (tritium) and air (tritium and natural radon) emissions, consistent with the Department of Energy waste minimization policy, which allowed for tritium decay in transit in confined ground water.
- Prevent unauthorized access.
- Economic considerations: (i.e. eliminate waste water treatment-disposal costs, eliminate annual cost for tunnel; maintenance, delay electrical upgrade requirements until reopening.

2.2 *Plug Design and Construction*

The Gas Seal Plugs (GSPs) were designed to withstand the direct blast effects of an underground NWET and remain leaktight under potential high-pressure loading of 500 pounds per square inch (psi) and a temperature of 500°F. The GSPs are keyway-type plugs made of positive expansion (negative contraction) concrete and groutcrete placed monolithically. The plugs are nominally 18 ft. long with one asymmetrical keyway (approximately 10 ft. wide by 5 ft. deep) around the entire periphery. A ring of 18 to 30 pre-grout holes, each 26 ft. to 40 ft. deep, were drilled in the bottom of the keyway and the holes were pressure grouted until a minimum 250 phi was maintained for five minutes. Two rings of post-grout holes were pressure grouted subsequent to the monolithic placement of the concrete and groutcrete plugs. The concrete and groutcrete had minimum unconfined compressive strengths of 4000 psi. The tunnels were pressurized to leak test the plugs and surrounding rock. The plug area was pressure grouted to seal any leaks during pressurization test.

The design criteria for the GSDs were not as demanding as that required for the GSPs. The Gas Seal Doors (GSDs) were designed to remain leaktight under a pressure loading of 75 psi and a temperature of 75°F. The GSDs are pre-fabricated, single leaf doors with steel jambs. The GSDs are keyed into the tunnel and pressure grouted similar to the GSPs. The GSDs can be considered a secondary containment feature.

3.0 Tunnel Closure

3.1 N-Tunnel

All fire extinguishers, hydraulic fluid, one oil filled non-PCB transformer, asbestos backboards, and fluorescent light fixtures will be removed from the tunnel.

The sample collection lines in each GSP, U12n. Main drift and U12n. Extension drift, will be fully grouted with an epoxy compound or cement grout. The valves will be closed, pressure gauges and water sample ports removed, and the lines capped. A concrete sarcophagus will be built on the portal side of each GSP. The sarcophagus will cover the exposed portions of the sample collection lines to protect from potential rockfall.

The U12n. Main drift GSD will be closed and welded shut. The U12n. Extension GSD crawl-tube, 36-inch diameter by 12-foot long, access through the GSD to the GSP will be sealed on each end with a blind flange. The crawl-tube will be stemmed full with grout.

Temporary tunnel ventilation equipment will be removed from the portal area.

At the U12n. Main drift portal, the gate, steel sets, lagging, and loose rock, will be removed to competent ground under the brow. A shotcrete bulkhead will be constructed at that point to prevent unauthorized entrance to the tunnel.

At the U12n. Extension drift portal, the gate and frame will be removed. A shotcrete bulkhead will be constructed in competent ground under the brow to prevent unauthorized entrance to the tunnel.

3.2 T-Tunnel

All fire extinguishers, oil filled non-PCB transformer, potential asbestos water line insulation, and fluorescent light fixtures will be removed from the tunnel.

The four sample collection lines that penetrate the U12t. Main drift GSD, two for water sample collection at the GSD and two that extend through the GSP for water sample collection inside the GSP, will be fully grouted with an epoxy compound or cement grout. The valves will be closed, pressure gauges and water sample ports removed, and lines capped. A concrete sarcophagus will be built on the portal side of the GSD. The sarcophagus will cover the exposed portions of the sample collection lines to protect from potential rockfall.

Temporary tunnel ventilation equipment will be removed from the portal area. Ventilation ducts will be removed from the vent raise between the tunnel and the compressor/blower pad. The vent raise will be backfilled to the surface with native soil, or a combination of groutcrete and native soil.

At the portal, steel sets, lagging, and loose rock, will be removed to competent ground under the brow. A shotcrete bulkhead will be constructed at that point to prevent unauthorized entrance to the tunnel.

3.3 Material, Equipment, and Waste Disposition

All material, equipment, and waste removed from the tunnel will be dispositioned IAW governing regulations and/or local policy.

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APPENDIX E

FINAL FACILITY CLOSURE VERIFICATION SITE VISIT ATTENDANCE ROSTER

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ATTENDANCE LIST
N-and T-TUNNELS WALKDOWN
FEBRUARY 8, 2007

Nevada Division of Environmental Protection:
Greg Raab
Mark McLane
Denny Nicodemus

SNJV:
Wayne Griffin

DTRA:
Barbara Harris-West

NSTec:
Gerald Chavez-Construction
Annette Primrose-ER
Dan Tobiason-ER
Tim Echelard-ER
Elaine Solzano-IH
Derek Hall-Ecological Services
Art Francis-Facilities
George Salyer-Facilities

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